

CLAIMS:

1. A master substrate comprising a substrate layer (10) and a recording stack deposited on the substrate layer, the recording stack comprising:
 - a mask layer (12)
 - an interface layer (11) sandwiched between said mask layer and the substrate,5 said mask layer comprising a recording material for forming marks and spaces representing an encoded data pattern, said forming of marks by thermal alteration by a focused laser beam and said marks having a different phase than the unrecorded material.
- 10 2. A master substrate as claimed in claim 1, wherein said recording material is a growth-dominated phase-change material, said material is an alloy comprising at least two materials of the group of materials containing Ge, Sb, Te, In, Se, Bi, Ag, Ga, Sn, Pb, As.
- 15 3. A master substrate as claimed in claim 1, wherein said recording material is a Sb-Te alloy material, in particular Sb_2Te doped with Ge and In.
4. A master substrate as claimed in claim 1, wherein said recording material is a Sn-Ge-Sb-alloy material, in particular with the composition $\text{Sn}_{18.3} - \text{Ge}_{12.6} - \text{Sb}_{69.2}$.
- 20 5. A master substrate as claimed in claim 1, wherein said mask layer (12) has a thickness in the range from 2 nm to 50 nm, preferably between 5 and 40 nm.
6. A master substrate as claimed in claim 1, wherein said interface layer (11) is made of a material of the group of dielectric materials containing ZnS-SiO_2 , Al_2O_3 , SiO_2 , Si_3N_4 .
- 25 7. A master substrate as claimed in claim 1, wherein said interface layer (11) comprises at least one organic dye selected from the group phthalo-cyanine, cyanine and AZO dyes.

8. A master substrate as claimed in claim 1, wherein said interface layer (11) comprises an organic photoresist selected from the group Diazonaphthoquinone-based resists.

9. A master substrate as claimed in claim 1, wherein said interface layer (11) has
5 a thickness in the range from 5 nm to 200 nm, in particular between 20 and 110 nm.

10. A master substrate as claimed in claim 1, wherein the recording stack further comprises a protection layer (81) adjacent the mask layer (12) at a side most remote from the substrate.

10

11. A master substrate as claimed in claim 10, wherein said protection layer (81) has a thickness between 2 and 50 nm, in particular between 5 and 30 nm.

12. A master substrate as claimed in claim 10, wherein said protection layer (81)
15 is made of the group dielectric materials containing ZnS-SiO₂, Al₂O₃, SiO₂, Si₃N₄, Ta₂O.

13. A master substrate as claimed in claim 10, wherein said protection layer (81) comprises an organic material, in particular selected from the group Diazonaphthoquinone-based photoresists, or from the group soluble organic materials, like PMMA.

20

14. A master substrate as claimed in claim 1 or 10, wherein the recording stack further comprises a second interface layer (82) between said substrate layer and said interface layer (11).

25 15. A master substrate as claimed in claim 14, wherein said second interface layer (82) has a thickness between 10 and 100 nm, preferably between 15 and 50 nm.

16. A master substrate as claimed in claim 1, 10 or 14, wherein a metal heat sink layer (83) is present between said substrate layer and said interface layer (11) or (82).

30

17. A master substrate as claimed in claim 16, wherein said metal heat sink layer (83) has a thickness larger than 5 nm, in particular larger than 15 nm.

18. A master substrate as claimed in claim 16, wherein said metal heat sink layers (83) comprises a material selected from the group of materials Al, Ag, Cu, Ag, Ir, Mo, Rh, Pt, Ni, Os, W and alloys thereof.

5 19. A method of manufacturing a stamper for replicating a high density relief structure comprising at least the steps of

- illuminating a master substrate as claimed in any one of claims 1 -18 a first time with a modulated focused radiation beam,
- rinsing the illuminated master substrate layer a first time with a developer, being one of an
- 10 alkaline or an acid liquid, preferably selected of the group of solutions of NaOH, KOH, HCl and HNO₃ in water, such that a desired first relief structure results,
- sputter-deposition of a metallic layer, in particular a Nickel layer,
- galvanically growing the sputter-deposited layer to the desired thickness forming a stamper,
- separating the master substrate from the stamper.

15 20. A method as claimed in claim 19, further comprising the steps of :

- after rinsing the master substrate the first time, illuminating the interface layer of the master substrate for a second time through the first relief structure, serving as a mask,
- rinsing the illuminated master substrate layer a second time with a developer, being one of
- 20 an alkaline or an acid liquid, preferably selected of the group of solutions of NaOH, KOH, HCl and HNO₃ in water, such that the first relief structure is deepened to form a second relief structure.

21. A method as claimed in claim 19 using a master substrate as claimed in claims

25 1, 10, 14 or 16, the mask layer (12) having a thickness in the range 5-35 nm wherein a pre-grooved shaped first relief structure is formed for replication of write-once and rewritable optical discs.

22. A method as claimed in claim 19 using a master substrate as claimed in claims

30 1, 10, 14 or 16, the mask layer (12) having thickness in the range 5-35 nm wherein the second relief structure is formed in both the mask layer (12) and the interface layer (11).

23. A method as claimed in claim 19 using a master substrate as claimed in claim 1, the mask layer (12) having a thickness in the range 5-35 nm, wherein the second relief

structure is further deepened, by etching, to form a third relief structure such that the third relief structure is contained in the mask layer (12), the interface layer (11) and partly in the substrate (10).

5 24. A method as claimed in any one of claims 19 - 23, in which the developer solution is used in a concentration 1-30%, preferably between 2 and 20%.

10 25. A pre-recorded optical disc replicated with the stamper manufactured with the method of any one of claims 19 to 24, characterized in that the relief structure on the stamper surface comprises shortest pits having a typical crescent and longer pits having a swallow-shaped trailing edge and that the relief structure is replicated in the optical disc.